Amendments to the Claims:

This listing of claims will replace all prior versions, and listing, of claims in the application:

Listing of Claims:

1. (Currently amended) An adhesive bond between

a substrate material having material having a nano-indented surface and a nano-indented solid region proximate to the surface comprised of polymer compounds with a low active surface energy in a range of fluoropolymers, and

a second material deposited particle-by-particle on the nano-indented surface of the substrate material while the nano-indented surface of the substrate material is in an energetically excited state, wherein

a nano-structured transition region comprising nano-composites is formed between the nano-indented substrate material and the second material in such a way that the transition region has a layer thickness between 20 nm and 20 μm and is predominantly formed of nano-composites, and wherein

a ratio of substrate material to the second material in a direction transverse to the transition region changes from predominantly nano-indented substrate material in an immediate vicinity of the nano-indented substrate material to predominantly the second material in an immediate vicinity of the second material, with the nano-indented substrate material transitioning into the second material with a nano-structure.

2. (Previously Presented) The adhesive bond according to claim 1, wherein the transition region comprises metal fractions or metal compounds in form of nano composites containing metal polymers.

3. (Withdrawn - Previously Presented) The adhesive bond according to claim 1, wherein the transition region comprises diamond-like components.

4. (Withdrawn - Previously Presented) The adhesive bond according to claim 1, wherein the transition region comprises nano-composites containing fluoropolymers.

Claims 5 - 9 (Canceled).

10. (Currently amended) A composite structure comprising

a substrate material of a first composition having a nano-indented surface and a nano-indented solid region proximate to the surface comprised of a polymer compound with a ~~low active~~ surface energy in a range of fluoropolymers,

a second material of a second composition disposed deposited particle-by-particle on the solid region of the nano-indented substrate while the nano-indented substrate is in an energetically exited state, and

a nano-structured transition region formed between the solid region of the nano-indented substrate and the second material, said nano-structured transition region having a layer thickness between 20 nm and 20 μm and comprising predominantly nano-composites,

wherein a composition of the nano-composites changes from a composition substantially identical to that of the nano-indented substrate material proximate to the nano-indented substrate material to a composition substantially identical to that of the second material proximate to the second material.

11. (Previously Presented) The composite structure of claim 10, wherein the nano-composites comprise metal fractions or metal compounds, or both.

12. (Previously Presented) The composite structure of claim 10, wherein the nano-composites comprise metal polymers.

13. (Withdrawn - Previously Presented) The composite structure of claim 10, wherein the nano-composites have a diamond structure.

14. (Withdrawn - Previously Presented) The composite structure of claim 10, wherein the nano-composites comprise α-C:H.

15. (Withdrawn - Previously Presented) The composite structure of claim 10, wherein the nano-composites comprise fluoropolymers.

16. (Withdrawn- currently amended) A method for producing an adhesive bond between a substrate material having a surface and a solid region proximate to the surface which includes polymer compounds with a ~~low active~~ surface energy in a range of fluoropolymers , and a second material, comprising the steps of:

nano-indenting a solid region of the substrate material proximate to the surface having the polymer compounds with ~~a low active~~ *the* surface energy to form a nano-indented surface,

activating the nano-indented surface by an excitation process which excites molecules of the polymer compounds, and

depositing the second material on the activated nano-indented surface particle-by-particle by a physical vapor deposition (PVD), by a chemical vapor deposition (CVD) process or by cathode sputtering, or by a combination thereof, while the polymer molecules are still in an energetically excited state, until the solid region proximate to the surface of the substrate material is completely covered with the second material.

17. (Withdrawn – Previously Presented) The method of claim 16, wherein the excitations process comprises a process selected from the group consisting of ion bombardment, ion beam processing, plasma processing, electron beam processing and laser beam processing.

18. (Withdrawn – Previously Presented) The method of claim 16, wherein the second material is deposited concurrently with activating the nano-indented surface.

19. (Withdrawn – Previously Presented) The method of claim 16, wherein the second material is deposited in parallel with activating the nano-indented surface.

20. (Withdrawn- Previously Presented) The method of claim 16, wherein nano-indenting the solid region of the substrate material proximate to the surface is performed in a separate process.

21. (Withdrawn – Previously Presented) The method of claim 16, wherein depositing the second material starts with a low deposition rate, with the deposition rate increasing continuously or step-wise until the second material completely covers the solid region proximate to the surface of the substrate material.

22. (Withdrawn – Previously Presented) The method of claim 16, wherein the second material is a non-metallic material, the method further comprising the step of depositing metal fractions on the activated nano-indented surface at least during a first phase of the particle-by-particle deposition of the second material.

23. (Withdrawn – Previously Presented) The method of claim 16, wherein the nano-indented surface is activated in a vacuum and the second material is also deposited particle-by-particle in a vacuum.

24. (Withdrawn – Previously Presented) The method of claim 23, wherein the vacuum has a pressure between approximately $1x10^{-1}$ mbar and $1x10^{-5}$ mbar.

25. (Previously Presented) The adhesive bond of claim 1, wherein the transition region comprises metal polymers.

26. (Withdrawn – Previously Presented) The adhesive bond of claim 1, wherein the transition region comprises nano-composites containing α-C:H.